

OUTCOME OF SMALL FRAGMENT DCP FOR FRACTURE OF RADIUS & ULNA IN ADULTS

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ABSTRACT:

INTRODUCTION:

Diaphyseal fractures of radius and ulna are common orthopedic injuries¹. They can cause significant loss of function if inadequately treated². The goal of treatment is good bone healing with preservation of upper limb function^{2,3}. Both operative and non operative treatment methods are available but operative treatment with small fragment dynamic compression plate fixation is recognized as treatment of choice for these fractures⁴. Non union is a major complication of this procedure⁵, which can be disabling as it affects not only the forearm but also the elbow and wrist⁶.

OBJECTIVE:

To determine the outcome of Small Fragment Dynamic Compression Plate fixation for Diaphyseal fractures of radius and ulna in adults on the basis of frequency of union and non union.

STUDY DESIGN:

Descriptive case series.

SETTINGS:

Orthopedic Department Allied Hospital, Faisalabad, Madina Teaching Hospital, Faisalabad.

RESULTS:

97 patients (76 males, and 21 females) with a mean age of 30.86+/-10.30 years were operated for small fragment dynamic compression plate fixation between June 2010 and May 2011. Out of the total 97 patients, 90 (92.8%) patients showed union while 07(7.2%) patients showed non union. Outcome in terms of union was excellent in 63 (64.9%) patients, good in 27 (27.8%) and poor in 7(7.3%) patients.

CONCLUSION:

The small fragment dynamic compression plate fixation is the treatment of choice for Diaphyseal fractures of radius and ulna in adults. Non union is an important Complication of this procedure and needs to be evaluated.

KEYWORDS: Diaphyseal fractures, Dynamic compression plate, Non union

INTRODUCTION:

Diaphyseal fractures of forearm bones form a large percentage of long bone fractures presenting at an orthopedic center⁷. They are difficult to manage and can challenge the

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treating physician⁸. In case of forearm fractures, not only regaining length, apposition and axial alignment, is important, but achieving normal rotational alignment is also necessary. At present both open and closed methods of treatment are widely used, including operative reduction with internal fixation followed by a variable period of external immobilization⁹ and non operative reduction with external splinting that allows some motion of the wrist and elbow.

Most investigators have been unable to achieve acceptable results in the adult forearm fracture with closed reduction and plaster cast immobilization¹⁰. Healing occurs reliably after closed treatment but mal-union and resultant decreased rotation of the forearm is common and has been associated with poor results¹¹. Good outcome can be achieved with closed reduction in case of distal radial fractures¹², and in most of the forearm fractures in children^{13,14}, but in adults, closed reduction seems to be an unreliable method as it cannot achieve full forearm function.

Goals of achieving union with restoration of anatomy and good hand function are best achieved by operative treatment¹⁵. The appliances used for internal fixation include intramedullary fixation with wires, rush pins, nails and plate fixation with standard and special plates. Due to unacceptable results of closed method and due to less than excellent results of a variety of intra-medullary appliances, more rigid fixations were sought by means of plates and screws. Both standard and special plates are used but 3.5 mm Dynamic compression plate is considered the standard implant for plate fixation^{2,4}.

Plate fixation was started in 1895 with simple metal plate, the use of which was soon abandoned due to corrosive potential, and it evolved over the years eventually to Dynamic Compression Plate which is considered standard implant for plate fixation.

Although Dynamic Compression plate has been evaluated by many studies and found to be a treatment of choice^{4,8}, but like other procedures it is sometimes associated with complications which are the subject of concern and worry for the orthopedic surgeon. One of the major complications is

non union and the present study has highlighted the non union which is an important complication and has evaluated the results of Dynamic compression plate (DCP) fixation on the basis of union and non union and also to assess the outcome of this procedure in terms of union.

METHODOLOGY:

Study Design:

Descriptive case series

Duration & Settings:

Duration of the study was 11 months and it was conducted in Orthopedic departments of Allied hospital Faisalabad & Madinah Teaching Hospital, Faisalabad.

Sampling Technique:

Non probability, consecutive sampling. 97 patients between the age of 18 & 60 years with closed fractures of radius and ulna were operated with small fragment DCP between June 2010 and may 2011 after informed consent. The patients suffering from polytrauma, unfit for anesthesia, with pathological or open fracture or with fracture more than 3 weeks old were not included in the study. The purpose of the study was explained to the patients. All patients were managed initially according to the ATLS protocols and were thoroughly assessed for any associated injuries.

Both AP and lateral views x-rays were taken to confirm the diagnosis of radius and ulna Diaphyseal fractures. Back slab plaster was initially applied to all patients. After confirmation of fitness for anesthesia, all patients were underwent open reduction and internal fixation with small fragment DCP.

Further follow up of the patients were done at 6 weeks, 12 weeks, 18 weeks, and finally at 6 months. At each visit the patients were assessed for clinical and radiological signs of union. Definition of non-union included patient with no radiographic signs of union up to 6 months after the procedure, which is approximately double the mean time of union for fractures of radius and ulna. Fractures were considered to be united clinically in the absence of movement and pain on stress at the fracture site. Radiographic union was confirmed by the appearance of uniform and

continuous ossification of callus, with consolidation and development of trabeculae across the fracture site. The outcome of the patients was categorized into three groups, i.e. Excellent, Good and Poor based on the time after which union occurred.

RESULTS:

There were a total of 97 cases falling in the inclusion criteria. The mean age was 30.86 ± 10.30 years. The youngest patient was 18 years of age and oldest patient was 60 years old (Table -1). Most of these fractures i.e. 60 cases (61.9%) were encountered between the 18 to 30 years of age (Table-2). There were 76 (78.4%) males and 21 (21.6%) females. The clinical results of this study were based on outcome in terms of union. There were 90(92.8%) patients who showed union during the study period and 7(7.2%) patients who were labeled as non union. Out of 76 male patients 6 (7.9%) exhibited non union and out of 21 female patients only 01 (4.7%) showed non union.(Table 3). Outcome of the patients was further analyzed according to three groups.

Excellent Outcome:

i.e. union at or before 12 weeks was observed in 63(64.9%) patients.

Good Outcome:

i.e. union after 12 weeks was observed in 27(27.8%) patients.

Poor Outcome:

i.e. no signs of union till 6 months (24 weeks) was observed in 7 (7.3%) patients. Excellent outcome was mostly showed by relatively young patients(18-30 years). Out of 63 patients who showed excellent outcome 43 (68.2 %) were between 18 to 30 years of age (Table- 4).

Table-1: Age in Years

Number of patients	Minimum age	Maximum age	Mean age	Std. deviation
97	18	60	30.86	10.30

Table -2: Age Distribution

Age (In years)	Frequency	Percent
18-30	60	61.9
31-42	24	24.7
43-55	11	11.3
43-55	11	11.3
Above 55	2	2.1
Total	97	100.00

Table-3: Gender Wise Distribution of Union

Gender		Frequency	Percent
Male	Union	70	92.1%
	Non Union	6	7.9%
Female	Union	20	95.3%
	Non Union	01	4.7%

Table-4: Age Wise Distribution of Outcome

AGE (In years)	Excellent outcome	Good Outcome	Poor Outcome	Total
18-30	43	15	2	60
31-42	16	7	1	24
43-55	4	4	3	11
Above 55	0	1	1	2
Total	63	27	07	97



Preoperative x-ray

Postoperative x-ray

DISCUSSION:

Diaphyseal fractures of radius and ulna present specific problems not encountered in the treatment of other long bone fractures. In addition to regain length, apposition and axial realignment, achieving normal rotational alignment is necessary⁴. Imperfect treatment can lead to poor bone healing along with loss of motion and poor hand function¹⁶. So union with restoration of

normal anatomy should be the goal of treatment for these fractures.

Non operative methods include closed reduction and pop cast or functional braces. In Children, most of these fractures can be treated by non operative methods¹⁷, but in adults, these methods have produced poor functional outcome. Knight and Purvis¹⁸ found unsatisfactory results in 71 % patients treated by closed methods. Only Sarmiento *et al*¹⁹ reported excellent results in 43 patients treated by closed methods.

The implants used for ORIF include intramedullary appliances and standard and special plates. The results of intramedullary fixation of Diaphyseal forearm fractures have also not been very encouraging. Smith and Sage⁹ in a study of 555 patients treated with intramedullary fixation found 20 % non union and high incidence of poor functional outcome.

The purpose of the present study was to evaluate the results of compression plate fixation in terms of union and non union. Mean age was 30.86 years with a range of 18-60 years. Most of the patients (61.9 %) were between 18 and 30 years. There were 76(78.4%) males and 21 (21.6%) females. Females were less affected probably due to their less outside exposures. Goldfarb *et al*²⁰ in his study of 23 patients treated with DCP found 14 males and 9 females. Mean age was 40 years with a range of 19-84 years.

In our study Union was observed in 90(92.8%) patients and non union in 07(7.4%) patients. Anderson *et al*⁵ studied 330 cases which were fixed with small fragment DCP and found union rate of 97%. Chapman *et al*²¹ found 90% union rates in his study of 129 patients. Hurtle *et al*²² presented results of 132 patients fixed with DCP and found 96.2 % union rates. Most of the other authors reported superior union rates and functional outcome with small fragment DCP. In our study, we further elaborated the union rates by categorizing it into three broader groups, i.e. Excellent, good and poor. We found most of the patients (64.9%) with excellent outcome. Out of those with excellent outcome, 68.2 % patients were relatively younger, i.e. between 18 and 30 years. which further emphasizes the

importance of age for union of these fractures.

CONCLUSION:

Out of various treatment methods available for fracture of radius and ulna in adults, ORIF with small fragment DCP is by far the treatment of choice because union with restoration of nearly normal anatomy which are the optimum goals of treatment are best met with this treatment method.

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The sum total of excellence is knowledge.

Riches without faith are the greatest poverty.

Hazrat Ali

(Razi Allah Tala Anho)